FIG. 1

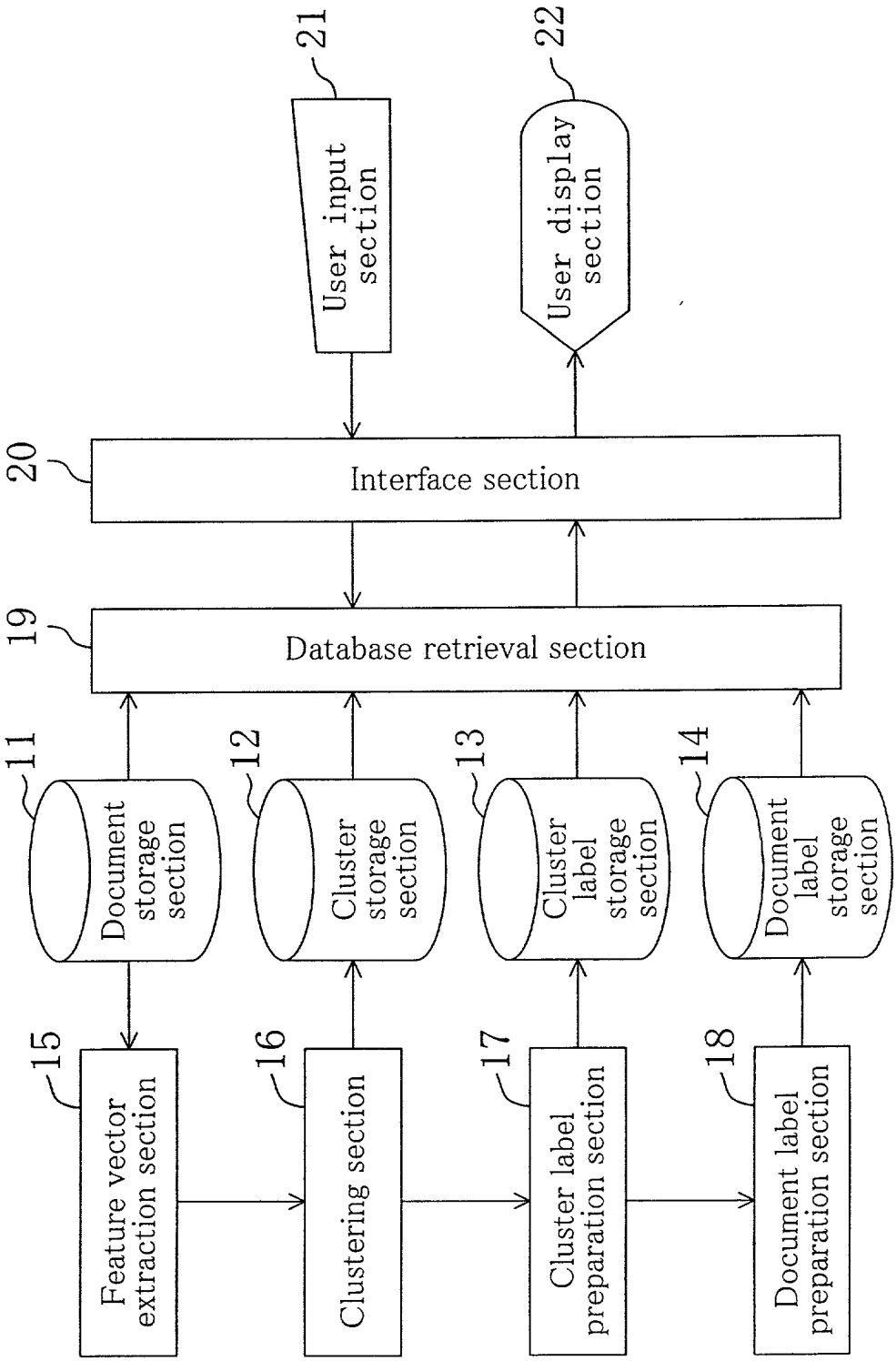
21
User input section
22
User display section
20
Interface section
19
Database retrieval section
11
Document storage section
12
Cluster storage section
13
Cluster label storage section
14
Document label storage section
15
Feature vector extraction section
16
Clustering section
17
Cluster label preparation section
18
Document label preparation section

FIG. 2

Document ID	Text
1	When you cannot suppress a desire for eating some sweet stuff, (1) eat chewy one that gives the feeling of satisfaction in a predetermined amount ...
2	As a principle, do exercise alone anytime and anywhere. Different persons have different livings and physical conditions. ...
3	You are absolutely right. If you are in trouble or ...
: n pcs.	:

Document Di

Title: INFORMATION RETRIEVAL SYSTEM
Inventor: Eiichi Naito, et al.
Atty. Ref. No.: 5077-000043
ATTORNEY: GREGORY A. STOBBS, Harness, Dickey & Pierce, P.L.C.

FIG. 3

Retrieved _ hits.

Cluster ID	Cluster label	Document ID	Documents
1	Confectionery, snack, cheese Watery food (jelly, pudding, yogurt)...	1	When you cannot suppress a desire for eating some sweet stuff, (1) eat chewy one that gives the feeling of satisfaction in a predetermined amount. ...
		190	Take milk, dairy products (cheese, yogurt, etc.) for a snack ...
		432	You may freely choose a snack within 200 kcal. ... If a low-calorie snack is desired, low-calorie sweetener ...
		644	When you cannot suppress a desire for eating some sweet stuff, - eat chewy one that gives the feeling of satisfaction. ... all to fall within a total amount of 200 kcal per day ...

previous cluster next cluster

FIG. 4

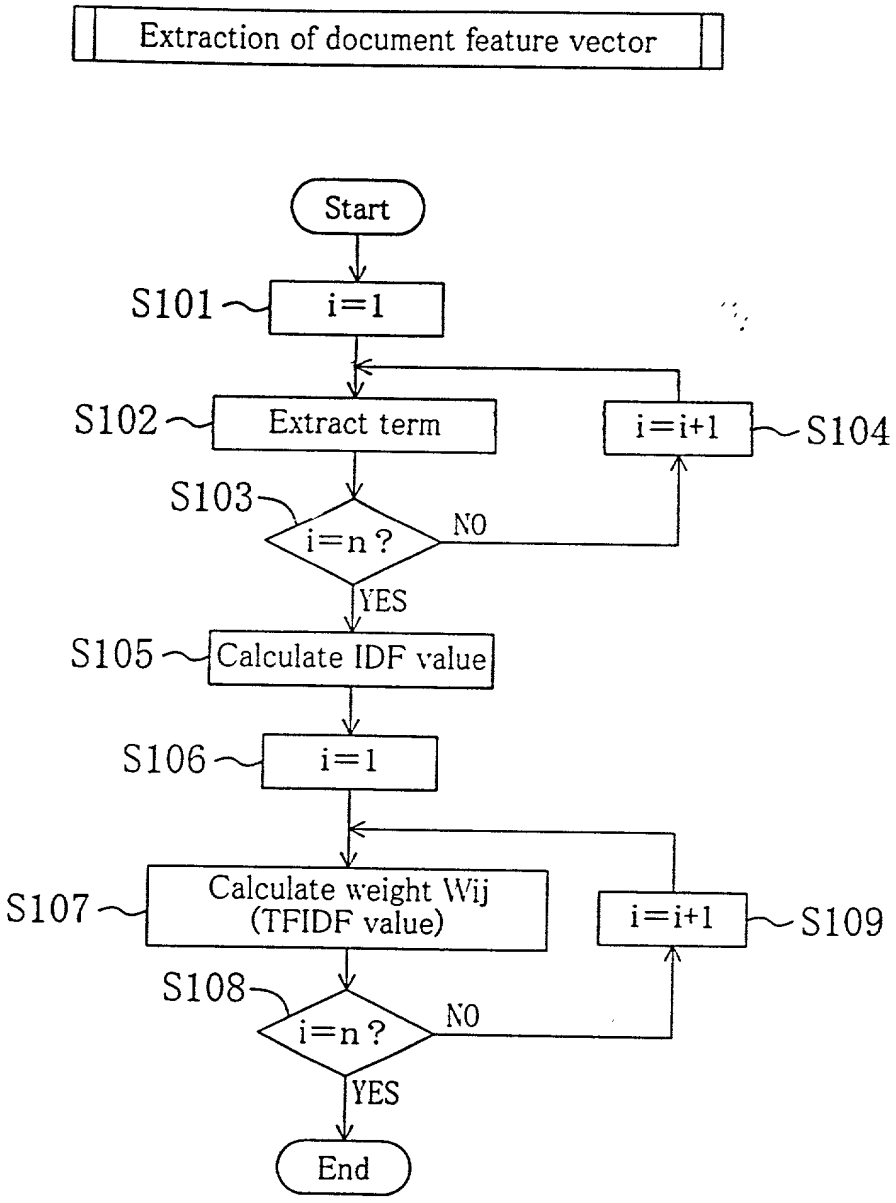
Extraction of document feature vector
Start
S101
i=1
S102
Extract term
i=i+1
S104
S103
i=n ?
NO
YES
S105
Calculate IDF value
S106
i=1
S107
Calculate weight Wij
(TFIDF value)
i=i+1
S109
S108
i=n ?
NO
YES
End

FIG. 5

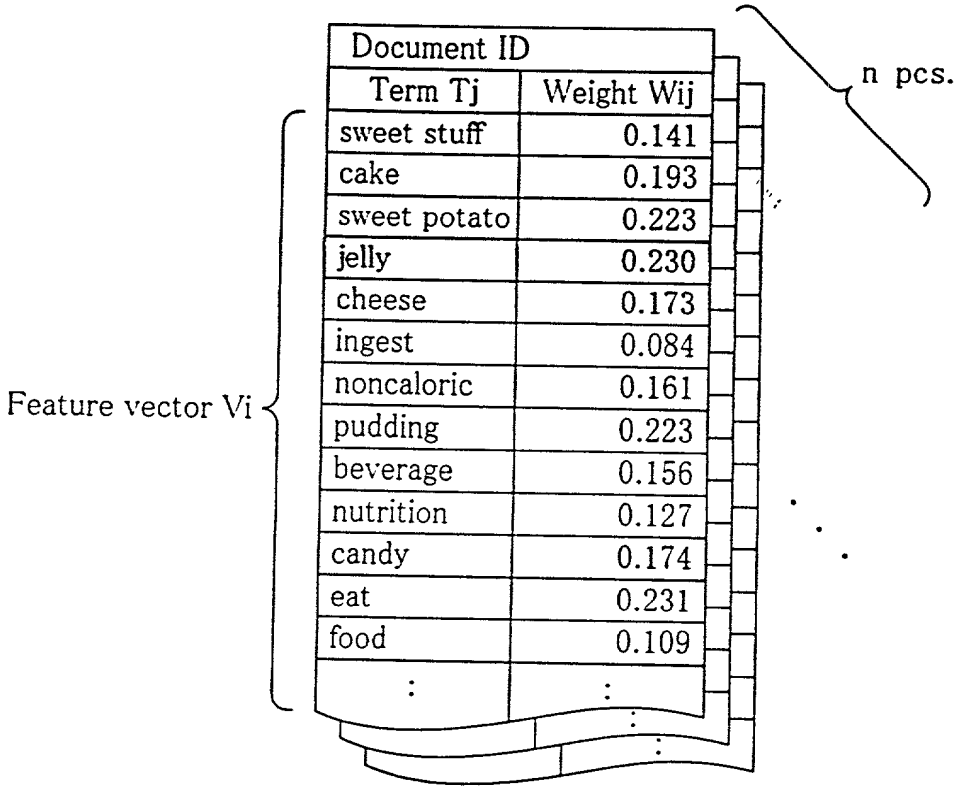
Document ID
Term Tj
Weight Wij
sweet stuff 0.141
cake 0.193
sweet potato 0.223
jelly 0.230
cheese 0.173
ingest 0.084
noncaloric 0.161
pudding 0.223
beverage 0.156
nutrition 0.127
candy 0.174
eat 0.231
food 0.109
n pcs.
Feature vector Vi

FIG. 6

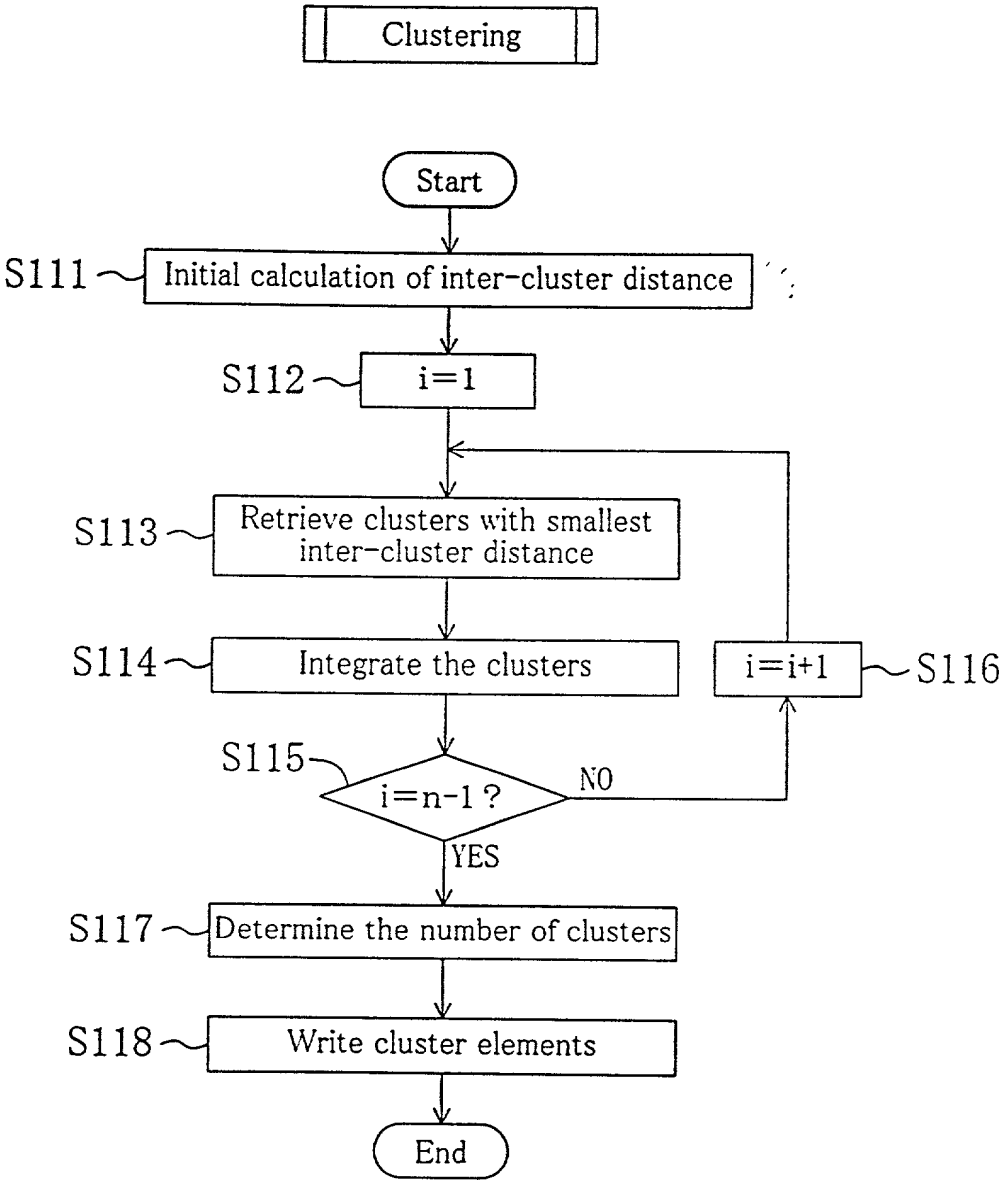
Clustering
Start
S111
Initial calculation of inter-cluster distance
S112
i=1
S113
Retrieve clusters with smallest inter-cluster distance
S114
Integrate the clusters
S115
i=n-1 ?
NO
YES
i=i+1
S116
S117
Determine the number of clusters
S118
Write cluster elements
End

FIG. 7

Cluster ID	Document ID
1	1, 190, 432, 644
2	2, 412, 3, 158
3	3, 158
4	4, 109, 182, 615
:	:

FIG. 8

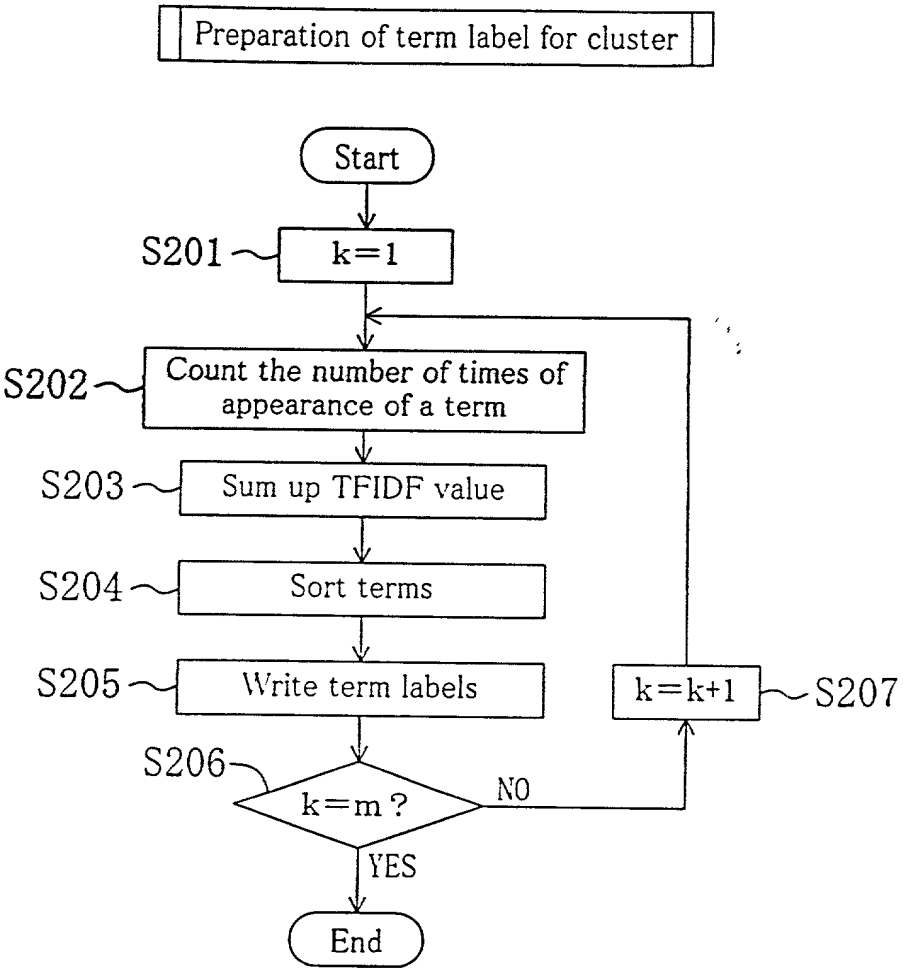

FIG. 9

Cluster ID	Term label
1	sweet stuff, snack, cheese
2	physical condition, exercise, effect
3	stress, positive thinking, status
4	menses, appetite, diet
:	:

FIG. 10

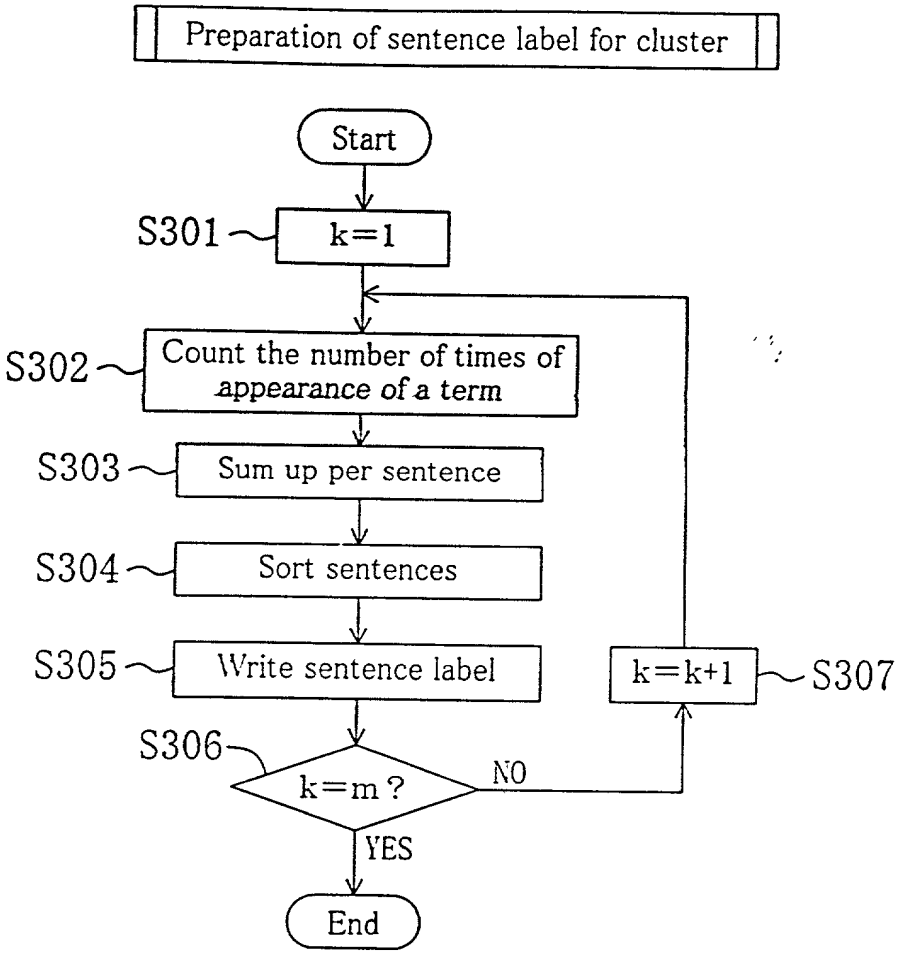

FIG. 11

Cluster ID	Text label
1	Watery food (jelly, pudding, yogurt)...
2	When you are in poor physical condition during your menstrual period, do not force yourself to do exercise ...
3	Clarify the cause of the stress ...
4	Not to disturb your diet pace even before your menstrual period ...
:	:

FIG. 12

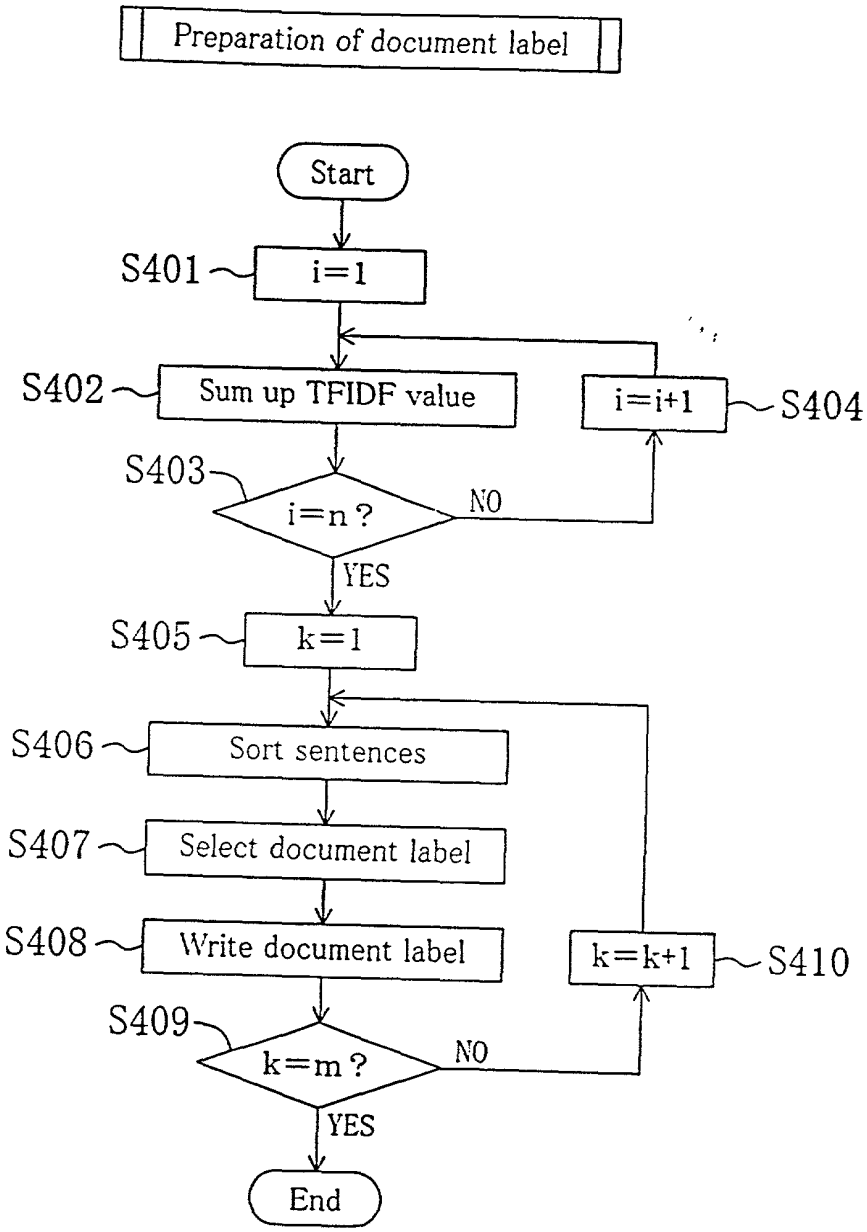
Preparation of document label
Start
S401
i=1
S402
Sum up TFIDF value
i=i+1
S404
S403
i=n ?
NO
YES
S405
k=1
S406
Sort sentences
S407
Select document label
S408
Write document label
k=k+1
S410
S409
k=m ?
NO
YES
End

FIG. 13

Cluster ID	Document ID	Document label
1	1	eat chewy one that gives the feeling of satisfaction ...
	190	Take milk, dairy products (cheese, yogurt, etc.) for a snack ...
	432	If a low-calorie snack is desired, low-calorie sweetener ...
	644	all to fall within a total amount of 200 kcal per day ...
	:	:
:		

FIG. 14

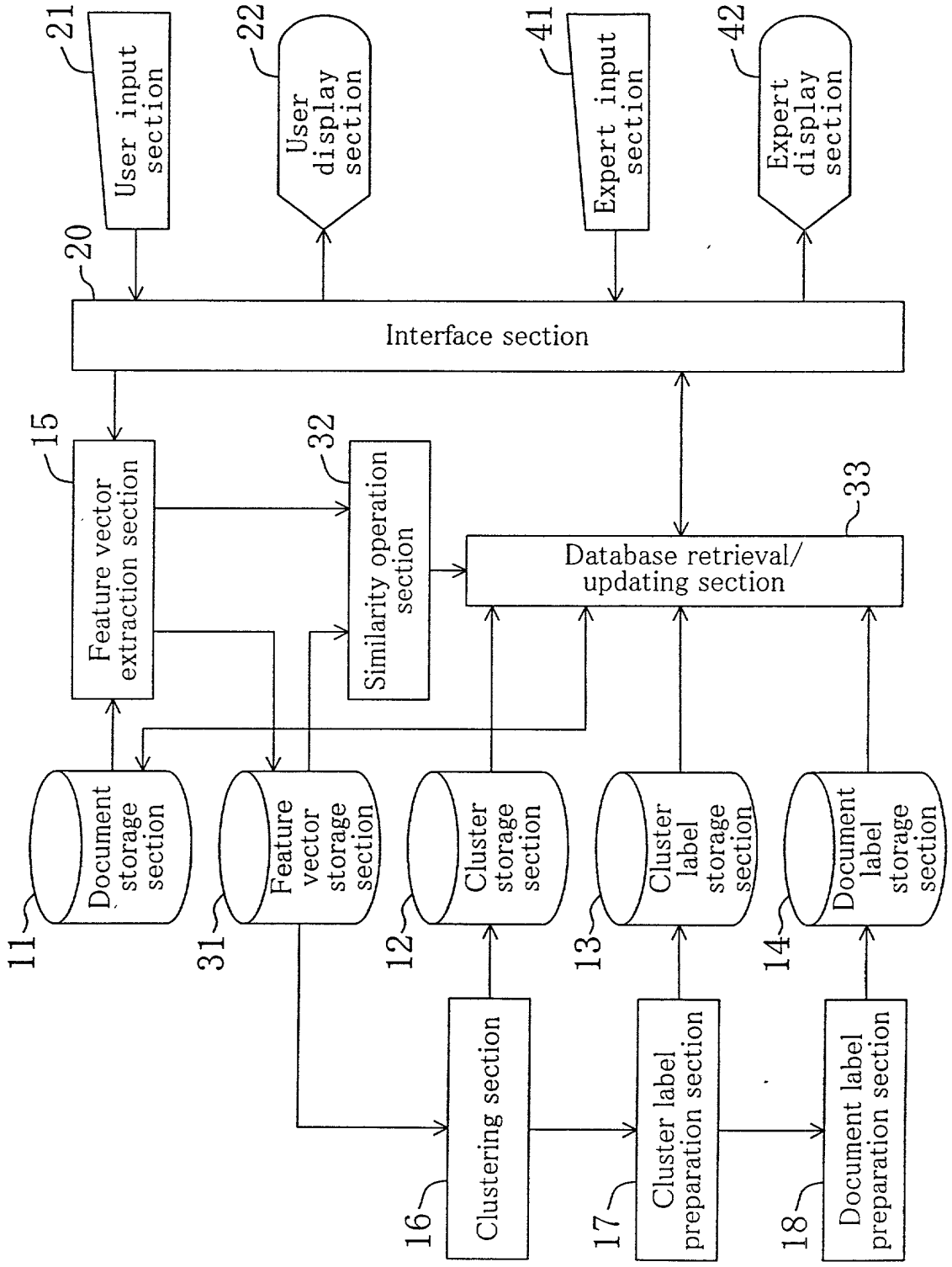
21
User input section
22
User display section
41
Expert input section
42
Expert display section
20
Interface section
15
Feature vector extraction section
32
Similarity operation section
33
Database retrieval/ updating section
Document storage section
Feature vector storage section
Cluster storage section
Cluster label storage section
Document label storage section
11
31
12
13
14
Clustering section
Cluster label preparation section
Document label preparation section
16
17
18

FIG. 15

Table of questions

Question ID	Questions	Associated document ID
1	When I cannot suppress a desire for eating some sweet stuff, what kind of stuff may I eat?	1
2	I heard early morning exercise before breakfast is most effective. How about evening aerobic exercise?	2
3	My menses is behind more than a week this month...	3
:	:	:

n pcs.

FIG. 16

List of answers

Document ID	Answers
1	When you cannot suppress a desire for eating some sweet stuff, (1) eat chewy one that gives the feeling of satisfaction in a predetermined amount ...
2	As a principle, do exercise alone anytime and anywhere. Different persons have different livings and physical conditions. ...
3	You are absolutely right. If you are in trouble or ...
:	:

m pcs.

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FIG. 17

Question
When I cannot suppress a desire for eating some sweet stuff, what kind of stuff may I eat? ...

Answers			
Cluster ID	Sentence label	Document ID	Documents
1	Watery food (jelly, pudding, yogurt)...	1	When you cannot suppress a desire for eating some sweet stuff, (1) eat chewy one that gives the feeling of satisfaction in a predetermined amount. ...
		190	Take milk, dairy products (cheese, yogurt, etc.) for a snack ...
		432	You may freely choose a snack within 200 kcal. ... If a low-calorie snack is desired, low-calorie sweetener ...
		644	When you cannot suppress a desire for eating some sweet stuff, - eat chewy one that gives the feeling of satisfaction. ... all to fall within a total amount of 200 kcal per day ...

previous cluster next cluster

FIG. 18

Question
When I cannot suppress a desire for eating some sweet stuff, what kind of stuff may I eat?

Answer
When you cannot suppress a desire for eating some sweet stuff, (1) eat chewy one that gives the feeling of satisfaction in a predetermined amount. ...

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FIG. 19

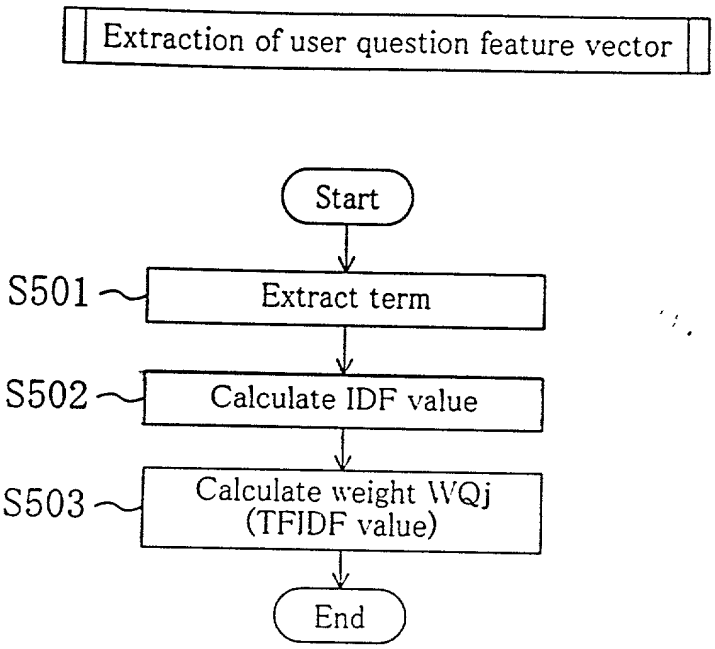
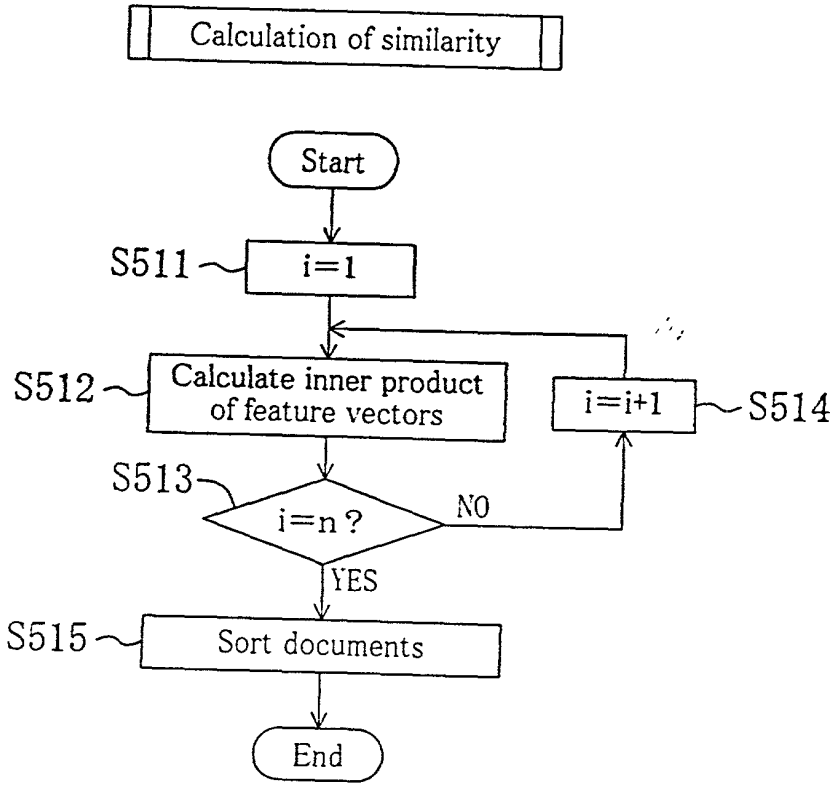


FIG. 20

Feature vector VQ

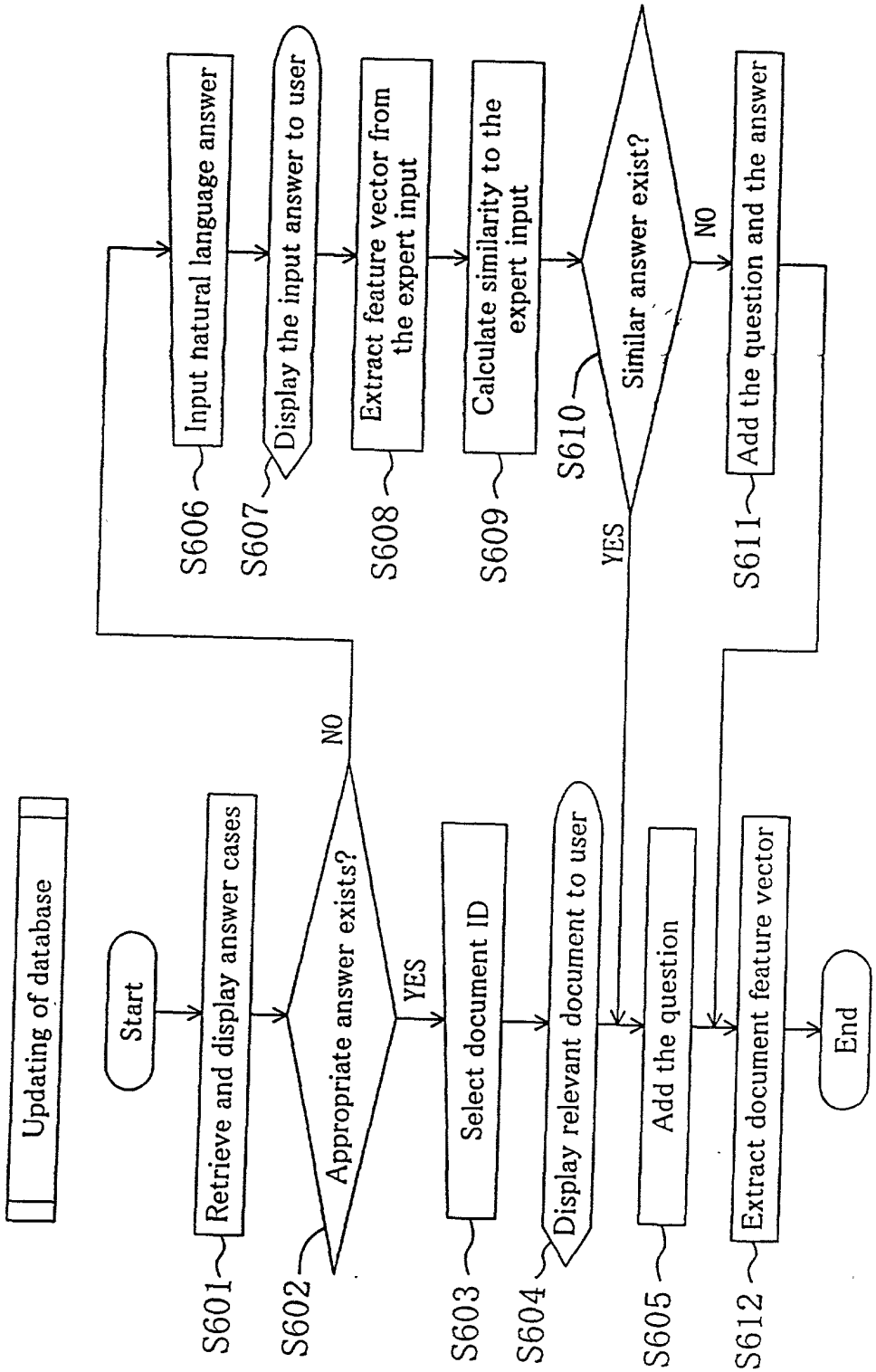
Term Tj	Weight WQj
sweet stuff	0.601
snack	0.452
I	0.400
eat	0.847
breakfast	0.556
method	0.456
:	:

FIG. 21



Express Mail Label No. EV 339 569 509 US

FIG. 22


Updating of database
Start
Retrieve and display answer cases
S601
Appropriate answer exists?
S602
NO
YES
Select document ID
S603
Display relevant document to user
S604
Add the question
S605
Extract document feature vector
S612
End
Input natural language answer
S606
Display the input answer to user
S607
Extract feature vector from the expert input
S608
Calculate similarity to the expert input
S609
Similar answer exist?
S610
YES
NO
Add the question and the answer
S611